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ABSTRACT

Eleven potential relationships exist among simultaneously presented messages in multi-image lectures. These are redundancy, cross-modality redundancy, generic/specific relationships, comparison/contrast, interaction of variables, parallel messages, analogical messages, temporal relationships, spatial relationships, generic concepts, and ideograms. These relationships do not, however, function discretely in an actual lecture. Other variables such as types and rates of change on screens and general aesthetic considerations can interact with those relationships to create the total effect of a multi-image lecture. (CH)

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Conceptual Relationships in Multiple-Image Instruction

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Designing a series of lectures with multiple-image visual support is a complex and difficult task. Because of the present experimental nature of this type of teaching there are few proven techniques for structuring multi-image presentations or analyzing them. No real taxonomy of multi-image messages has yet emerged.

As such, instructors and designers of multi-image programs and lectures tend to design by intuition. It is unnecessary here to enter the debate over the advisibility of intuitive teaching versus planned instruction based on behavioral objectives. After all, instructional goals vary, even within one lecture. At times, materials are used to stimulate discussion and the outcome is meant to be fluid and open--as much the result of student input as input by the teacher. At other times, however, the teacher wants to convey a specific message or concept and then proceed from there. In the latter case, at least, it would seem helpful for instructors to have an explicit conscious notion of how and why they are using certain instructional materials. This paper is a beginning attempt at analyzing the instructional potential of multi-image.

When messages are combined within channels or across channels, the result is not a simple cumulative one of A+B+C, but an entirely new message greater than the sum of its parts or at least different than the sum of its parts. This is so because the "meaning" of multi-image and multi-channel messages is often the outcome of a relationship which is established between messages, and not the direct result of the summation of discrete cues.

Knowlton (1966) gives us an example of such a "multi-image" message in his essay on pictures. He describes a textbook's use of two side-by-side pictures, one of the Empire State Building and one of a firefly:

> These pictures might have been intended to signify something about fireflies or buildings, and this is a most common use of pictures. But these particular illustrations happen not to have been used this way. They were not used to signify anything at all that can be directly seen. Rather, these particular illustrations were used to render pictorially the following verbal analogy:
>
> Height of Empire State Building=One Inch
> Length of a Firefly=One Micron
>
> That is, the intent of the authors was to convey an intuitive notion of the length of the very small unit, the micron. (p. 173).

It is the contention here that such relationships between messages are almost always the key factors in instructional multi-image presentations. It is not enough, therefore, to describe multi-image effects in terms of summation of cues or relevant and irrelevant cues (Severin, 1967a, 1967b). A more complex system is needed to codify relationships in multi-image lectures.

For the purpose of this exploratory discussion it will be assumed that the instructional situation consists of a "live" lecture with three-screen visual support (35mm slides). In such a multi-image lecture, there are three categories of potential conceptual links among messages: (1) links between the verbal lecture and the simultaneous visual presentation, (2) relationships among simultaneously presented visuals and (3) relationships between one image and the images directly preceding and following it.

This paper will be limited to a discussion of eleven potential relationships among simultaneously presented messages, both aural and visual. Relationships between one image and those before and after it will not be discussed here.

1. Redundancy

Essentially, redundancy involves the repetition of a message. For example, a definition could be verbally stated twice, or three slides of

the same word could be projected simultaneously, or a word could be both said and projected visually (see "Cross-Modality Redundancy" below).

In information theory, redundancy is related to the transmission of a message. The higher the redundancy of a message, the easier it is to receive the entire message even when there is channel "noise" or a competing message.

Too much redundancy, however, can lead to eventual loss in reception as receivers grow bored and their minds shift to other topics. Thus redundancy must be used in moderation and selectively. In general, redundancy in instructional situations can be seen as a tool for emphasizing important messages and setting them apart from less important messages.

2. Cross-Modality Redundancy

To distinguish redundancy which occurs across channels from repetition within the same channel, I will use the term "cross-modality redundancy." This differs from "pure" redundancy in that a different method of presenting information really provides a different message. For example, when a word is both said and visually projected at the same time, there are two distinct messages: the pronunciation of the word and its spelling. This is not straight redundancy in that each message provides information unique to its channel of presentation.

In practice, what often distinguishes "redundancy" from "cross-modality redundancy" is the perceiver's knowledge and experience. If the perceiver knows, for example, what the Taj Mahal looks like, how its name is spelled in English, and how its name is pronounced, then the verbal, aural, and photographic presentations of the Taj Mahal are functionally redundant. If the perceiver is not so well informed, then each channel provides a discrete message to him.

Thus in "cross-modality redundancy" the messages are redundant in that they all relate "naturally" to some generic object, person or place, but each message provides additional data related to a specific method of encoding information.

3. Generic/Specific

Here the link between messages is one of category and subcategory. Thus, an instructor can speak about painters (generic) and display a picture of Van Gogh (specific). Or in a visual display, one screen could say "painters," a second could picture Van Gogh and a third, the art of Van Gogh during a specific period. Similarly, in a biology lecture three screens could be used to display phylum, class and order, respectively. In addition, a triple screen presentation could present one generic concept and two equi-valued examples. Thus, using outline notation, this generic/specific relationship among three messages could be either I, A, 1 or I, A, B.

4. Compare and Contrast

In this use of simultaneous messages, the relationship is essentially one of equality: three species of animals, three paintings by one artist, three American Indian villages, etc. No message is a subcategory of another. (Within the outline of the lecture three such messages might be I, II, III, or A, B, C, etc.). Such juxtaposition of messages is used primarily for comparison and analysis of common and unique elements. The messages have no compulsory "logical" link between them (see "Relationship of Interacting Variables" below).

Obviously, multiple image is an ideal manner in which to analyze and compare visual elements, but this type of relationship can exist between a verbal statement and a visual as well, as long as that which is described

verbally is familiar to the perceiver. An instructor could, for example, ask his class how the pictured animal differs from a dog, or how the pictured British advertisement might be differently produced here in America.

5. Relationship of Interacting Variables

Here messages are presented to illustrate the interaction of variables. The three projection screens can, for example, be used to illustrate the interaction between supply, demand, and pricing in economics, or the relationship between f-stop, shutter speed, and depth of focus in photography, or student IQ, speed of instructional presentation, and test results in reporting the findings of a study.

This combination of messages differs markedly from "generic/specific" and from "comparison of elements." Here, when one variable changes, adjustments are required in the others as well. An excellent use of this technique involves random access projectors where instructors can dial to any slide in a projector, and give explicit examples of different combinations of variables in response to student questions and comments.

Here again, the visual presentation alone is not the only possible use of this technique. One or more independent variables can be described aurally and visuals can be used to illustrate the dependent variable.

6. Parallel Messages

Any situation with multiple instructional inputs can potentially be used to present a discrete series of messages through each input--series of messages which somehow parallel each other. For example, a history professor verbally describing Hitler's rise to power could use visuals not to illustrate Hitler or Germany, but to present headlines and events which occurred simultaneously around the world. Similarly, a history lecture on the counter-culture of the 1960's could use illustrations from mass media

television programs of the 1960's which embody exactly opposite ideals and mores. In these types of situations context and perspective are easily and quickly provided. In addition, an otherwise linear lecture can create a "true" sense of simultaneity which would be difficult to produce in any other way.

A similar effect can be produced by reserving one screen for parallel messages and using the other two screens for "illustrations" of the verbal lecture.

7. Analogical Messages

Simultaneous messages can also be used to draw analogies or present metaphors. For example, a discussion of the "law and order" policies of Richard Nixon could be illustrated with quotes from Mein Kampf or a lecture on the economic conditions of the 1970's could be illustrated with pictures from the Great Depression. Obviously, this use differs from "parallel messages" in that there is no "natural" link between the sets of messages and the juxtaposition is editorial in nature.

This type of analogy can be extended throughout a lecture or presentation. This technique was used by the author in a summary multi-image sequence for a lecture on political images. The metaphor of car advertisements was used to indicate the importance of image and to suggest that politicians were packaged and sold like products. In the presentation Nixon begins as a used Edsel but returns as a Chevy Nova ("You've changed, we've changed"). The Nixon team promises that it is "building a better way to see the USA" only to get into a serious collision and end up in an automobile graveyard. Other metaphors of political images included: McGovern as a VW "bug" in disguise, McCarthy as a Volvo ("For people who think"), Wallace as a trusty

and dependable Ford pick-up truck, and Mayor Daley as a Brinks armored car.

8. Temporal Relationships

Here, juxtaposed messages relate to different time periods in the same process: three visuals of an embryo, Berlin in 1936, 1946 and 1956, examples of one painter's work during three distinct periods. It is also possible to have a temporal relationship between a visual and a verbal description. One could, for example, picture a star athlete in 1976 while describing his childhood as a 98 pound weakling.

This type of relationship is similar to both "comparison and contrast" and "parallel" messages but its focus is on time, on process. The elements are also equal (I, II, III) but they represent specific stages in time ($time_1$, $time_2$, $time_3$).

9. Spatial Relationships

This is an essentially visual effect. Three screens can be used to illustrate different framings of the same object, person, etc. In architecture one could analyze three different views of a building. In plant biology the screens could be used to show different magnifications of the leaf structure of the same plant.

This technique is extremely helpful in studying minute detail. It allows students to maintain a constant sense of context and relation of part to whole. In studying the arteries of the heart, for example, it is important to maintain a sense of their relationship to the entire circulatory system.

10. Generic Concepts

It has been generally assumed that, unlike language, iconic pictures cannot convey abstractions (Gibson, 1954; Knowlton, 1966). It has been said, for example, that the word "man" connotes all men while a picture of a man is a picture of a specific man (from one culture, of a set age, with gray hair, etc.).

However, multi-image does potentially allow for iconic pictures to convey generic concepts. A series of images of men of different ages, backgrounds, and clothing can suggest the generic concept of "Man." Similarly, a series of car photos can suggest the generic concept of "car."

The use of visuals of specific items to convey the generic concept is aided by the proper verbal context. In some ways this use is similar to "comparison and contrast" but here the emphasis is on common elements, not on differences and peculiarities.

11. Ideograms

In some cases a visual is used as a kind of hieroglyphic to be understood only in juxtaposition with other images. Such a use of multi-image corresponds to the Japanese ideogram. Sergei Eisentstein described some examples of this use of images in his collection of essays Film Form (1949). Eisenstein says that the concept of "to weep" can be conveyed by combining a picture of water with a picture of an eye. Other examples include a dog + a mouth = "to bark," and an ear + a door = "to listen."

This use of images assumes that the visuals employed can be freed of their direct representational messages and used as generic representations. While explicit use of images to create ideograms is probably rare in instructional media, the "ideogram effect" is latent in virtually every juxtaposition of images, even when the manifest intent is direct representation. Eisenstein described the effect of the ideogram as follows:

> The point is that the copulation (perhaps we had better say, the combination) of two hieroglyphs of the simplest series is to be regarded not as their sum, but as their product, i.e. as a value of another dimension, another degree; each, seperately, corresponds to an object, to a fact, but their combination corresponds to a concept...By the combination of two 'depictables' is achieved the representation of something that is graphically undepictable. (pp. 29-30).

Granting that such conceptual relationships exist among simultaneous messages presented in multi-image lectures, why is it important for instructors and students to be conscious of them? After all, do not such relationships also exist in complex and fast-paced entertainment multiple-image shows? Are not these shows enjoyed and "understood" without such conscious knowledge of technique?

What such questions fail to take into account is the vast difference between entertainment and instructional programs. Not only do they differ in intent but also in content. Entertainment is designed to overwhelm and impress. Often the multi-image presentation itself is the major point; it is used as a gimmick. Further, entertainment content usually involves the lowest common denominator of symbols and pictures: the white house, the American flag, the Beatles. Thus, not only are conceptual relationships often of little importance in entertainment but because the content is well known the intended relationships are often obvious.

In teaching, however, it is, by definition, assumed that the "audience" is not familiar with the content and is unaware of the nature of the relationship among elements. This, after all, is what is being taught. The desired outcome is not primarily affective but cognitive. Both designers and perceivers of instructional programs, therefore, should be more conscious of technique and conceptual relationships.

This paper has briefly described some of the potential relationships among simultaneously presented messages in multi-image lectures. For the purpose of analysis these relationships were studied in isolation. They do not, however, always function discretely in an actual lecture. Further, this paper has not dealt with many other variables which interact with those

discussed to create the total "gestalt" of a multi-image lecture. These variables include types and rates of changes on each screen (dissolves, cuts, etc.), number of screens changing at once, screen position and size, order of change in sequences, different arrangements of the same three visuals, directional indicators within pictures and general aesthetic considerations. These limitations should be taken into account when applying the framework presented here to the analysis of multiple-image lectures.

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